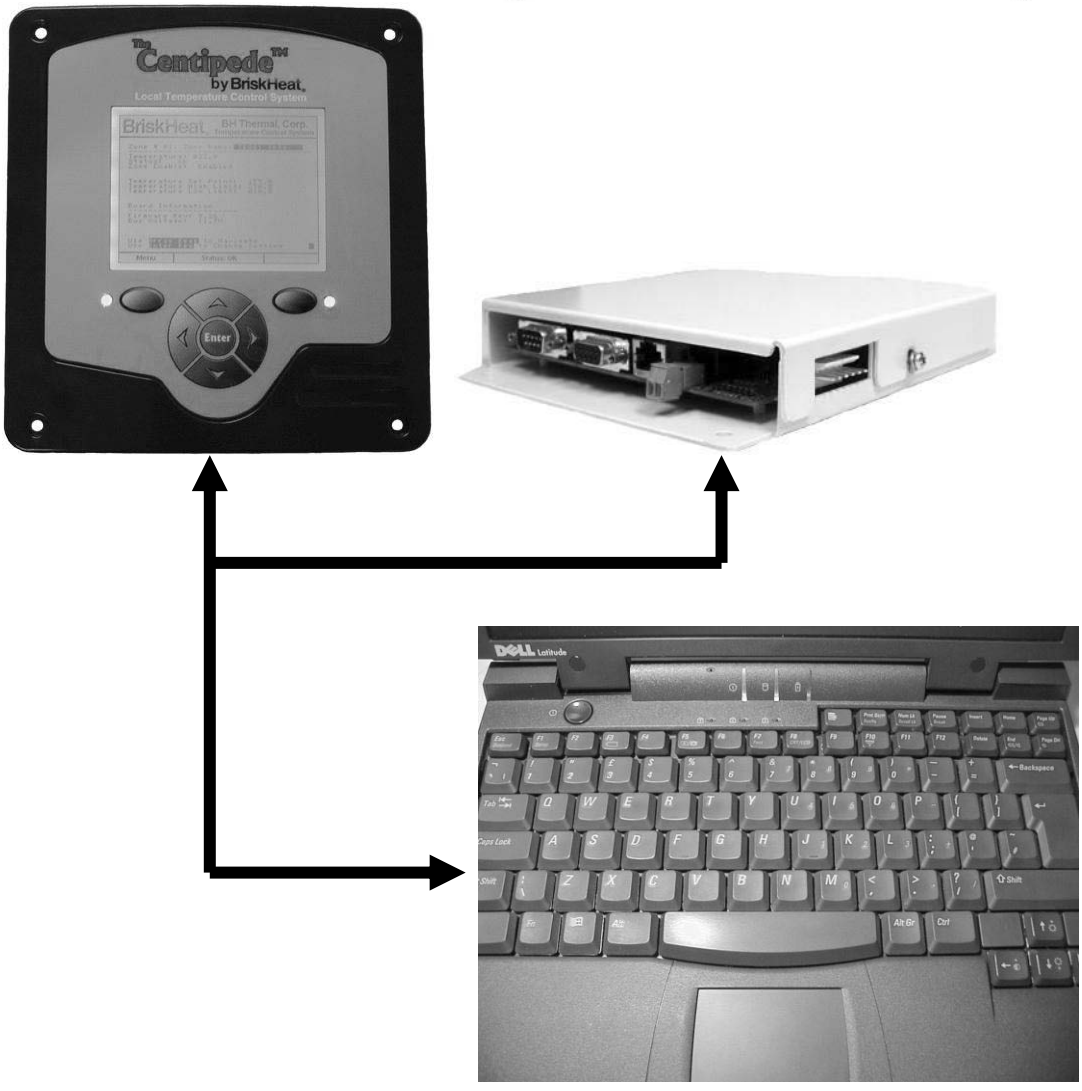
Centipede®
by BriskHeat®



Communicating with an External Computer

Instruction Manual

Part Number: 41082-01 Rev A

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Introduction

There are two modes available to communicate a Centipede® Operator Interface with an external computer:

1. Menu mode: An interactive menu designed for a person to manually operate a Centipede® Operator Interface through a PC.

Note: Type 'x' to enter menu mode while in computer / data logging mode.

2. Computer / data logging mode (default mode on start-up): An interface designed for
    a. Direct computer-to-computer communication using short form commands to read and write to an individual module or network of modules.
    b. Data logging

Note: Press or send Ctrl C at any point to enter computer / data logging mode.

Contact Information
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Connecting Operator Interface to External Computer

A Centipede® Operator Interface can be connected to any PC through the RS-232 port. Refer to Figures 1 and 2 to locate the RS-232 port.

Figure 1: Centipede® Operator Interface with Display (CENTOPI-2)

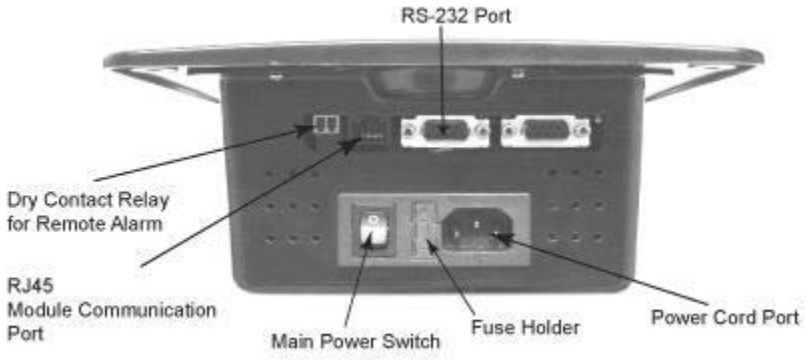
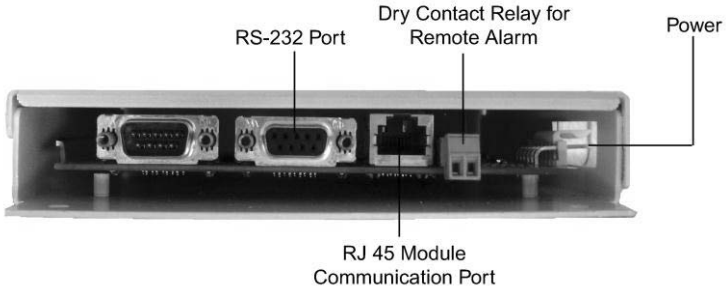


Figure 2: Centipede® Operator Interface without LCD Display (CENTOEMOI)



Once connected, load up a terminal-emulator program (e.g. HyperTerminal) and configure for a COMM port connection. Use the following settings:

Baud Rate: 19200
Stop Bits: 1
Parity: Even
Data: 8 bits
Flow Control: None

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Starting Up

When the system is powered on or RESET, the following display shows (this example system has a CENTOEMOI operator interface and three Centipede modules connected):

BH Thermal Corp
Temperature Control System - Firmware Build 0.51
Date Built: Jul 25 2005 17:43:20

LCD… Not Detected

Modbus Zone Discovery…
Zone broadcast: 1
Zone broadcast: 2
Zone broadcast: 3
Zone broadcast: 4
Zone broadcast: 5
Zone broadcast: 6
Zone broadcast: 7
Zone broadcast: 8
Zone broadcast: 9
Zone broadcast: 10
Zone broadcast: 11
Zone broadcast: 12
Zone broadcast: 13
Zone broadcast: 14
Zone broadcast: 15
Zone broadcast: 16
Zone broadcast: 17
Zone broadcast: 18
Zone broadcast: 19
Zone broadcast: 20
Zone broadcast: 21
Zone broadcast: 22
Zone broadcast: 23
Zone broadcast: 24
Zone broadcast: 25
Zone broadcast: 26
Zone broadcast: 27
Zone broadcast: 28
Zone broadcast: 29
Zone broadcast: 30
Zone broadcast: 31
Zone broadcast: 32
Zone broadcast: 33
Zone broadcast: 34
Zone broadcast: 35
Zone broadcast: 36
Zone broadcast: 37
Zone broadcast: 38
Zone broadcast: 39
Zone broadcast: 40
Zone 1 Detected
Zone 2 Detected
Zone 3 Detected

3 Zones Detected in Network

Data Logging Begins…

25.8 1 24.19 30.00 OK 2 24.73 175.00 LOW 3 24.74 175.00 LOW
27.1 1 24.19 30.00 OK 2 24.73 175.00 LOW 3 24.74 175.00 LOW
28.3 1 24.19 30.00 OK 2 24.73 175.00 LOW 3 24.74 175.00 LOW
29.6 1 24.19 30.00 OK 2 24.80 175.00 LOW 3 24.74 175.00 LOW
30.9 1 24.19 30.00 OK 2 24.80 175.00 LOW 3 24.74 175.00 LOW
32.2 1 24.19 30.00 OK 2 24.80 175.00 LOW 3 24.74 175.00 LOW

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Part I: Menu Mode

Type the letter ‘x’ in the PC terminal program to enter into the menu mode. To exit at any point, press Ctrl C.

Interactive Menu

```
Temp Control System Console Menu
1. Enable 5 Second Logging
2. Enable 10 Second Logging
3. Disable Data Logging
4. Read the Total Number of Zones in the System
5. Read Single Zone Status
6. Read Single Zone Temp
7. Read Single Zone Set Point Temp
8. Read Single Zone High Limit Temp
9. Read Single Zone Low Limit Temp
A. Read Single Zone Autotune Status
B. Set Single Zone Set Point Temp
C. Set Single Zone High Limit Temp
D. Set Single Zone Low Limit Temp
E. Reset Single Zone Autotune
F. Set Global Zone Set Point Temp
G. Set Global Zone High Limit Temp
H. Set Global Zone Low Limit Temp
I. Reset Global Zone Autotune
J. Wrong Zone Number
K. Global Temperature Alarms
L. Global Error Log
M. Enable Fast Zone Logging
N. Set External Alarm Relay State
O. Read Zone Name
P. Write Zone Name
Q. Read Data Modified Flag
R. System Reset
S. Clear Data Modified Flag

Z. Resume Data Logging

Enter a selection:
```

Type ‘1’ through ‘Z’ to select a desired option. ‘Z’ exits the menu mode and goes to the computer / data logging mode.

Note: Data logging is not performed while in the menu mode. Type ‘Z’ or press Ctrl C to resume data logging.

Menu Item #1: Enable 5 Second Logging

Enables the zone number, zone temperature and zone set point for all of the zones in the system to be logged every 5 seconds.

Logging format:

```
Timestamp   ZN1    CT1    SP1   STAT1   ZN2   CT2   SP2   STAT2…
```

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Timestamp - Number in seconds since the unit was powered on
ZN1 - Zone number 1
CT1 - Current temperature of zone 1
STAT1 - Current status of zone 1
ZN2 - Zone number 2
CT2 - Current temperature of zone 2
STAT2 - Current status of zone 2

A single space character (ASCII 0x20) delimits the fields. A new-line (ASCII 0x0D and 0x0A) is used at the end of each line.

Example - 3 zones

```
5.2 1 24.53 100 OK 2 25.34 105 OK 3 27.63 105 OK
10.2 1 24.57 100 OK 2 25.45 105 OK 3 27.70 105 OK
15.2 1 24.64 100 OK 2 25.45 105 OK 3 27.77 105 HIGH
```

Menu Item #2: Enable 10 Second Logging

Enables the zone number, zone temperature and zone set point for all of the zones in the system to be logged every 10 seconds.

Logging format:

```
Timestamp   ZN1    CT1    SP1   STAT1   ZN2   CT2   SP2   STAT2…
```

Timestamp - Decimal number in seconds since the unit was powered on
ZN1 - Zone number 1
CT1 - Current temperature of zone 1
STAT1 - Current status of zone 1
ZN2 - Zone number 2
CT2 - Current temperature of zone 2
STAT2 - Current status of zone 2

A single space character (ASCII 0x20) delimits the fields. A new-line (ASCII 0x0D and 0x0A) is used at the end of each line.

Example - 3 zones

```
10.2 1 24.53 100 OK 2 25.34 105 OK 3 27.63 105 OK
20.2 1 24.57 100 OK 2 25.45 105 OK 3 27.70 105 OK
30.2 1 24.64 100 OK 2 25.45 105 OK 3 27.77 105 HIGH
```

Menu Item #3: Disable Data Logging

When selected, data logging is disabled.

Menu Item #4: Read the Total Number of Zone in the System

Displays the total number of zones that have been detected in the system.

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Menu Item #5: Read Single Zone Status

Reads the status from a single zone.

Type '5': The following message is displayed:

```
Zone # (x - exits):
```

Enter the zone number to read. Push the enter key. One of the following values is displayed:

```
OK
HIGH
LOW
SHORT
OPEN
DISABLED
COMERR
```

If the zone number entered is out of range, the error code 'Invalid Entry' is displayed.

Status Definitions

OK:	Temperature is within high and low limits.
HIGH:	Temperature is above the high-limit.
LOW:	Temperature is below the low-limit.
SHORT:	The RTD input is shorted.
OPEN:	The RTD input is open or the RTD is not attached.
DISABLED:	The module/zone is disabled.
COMERR:	A communication error exists. The operator interface cannot communicate with the zone controller.

Menu Item #6: Read Single Zone Temperature

Reads the current temperature from a single zone.

Type '6': The following message is displayed:

```
Zone # (x - exits):
```

Enter the zone number to read. Push the enter key. The current temperature is displayed in °C as a decimal number:

```
ex: 123.50
```

If the zone number entered is out of range, the error code 'Invalid Entry' is displayed.

Menu Item #7: Read Single Zone Set-Point Temperature

Reads the current set-point temperature from a single zone.

Type '7': The following message is displayed:

```
Zone # (x - exits):
```

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Enter the zone number to read. Push the enter key. The current set-point is displayed in °C as a decimal number:

```
ex: 150.00
```

If the zone number entered is out of range, the error code 'Invalid Entry' is displayed.

Menu Item #8: Read Single Zone High Limit Temperature

Reads the current high limit temperature from a single zone.

Type '8': the following message is displayed:

```
Zone # (x - exits):
```

Enter the zone number to read. Push the enter key. The current high limit temperature is displayed in °C as a decimal number:

```
ex: 200.00
```

If the zone number entered is out of range, the error code 'Invalid Entry' is displayed.

Menu Item #9: Read Single Zone Low Limit Temperature

Reads the current low limit temperature from a single zone.

Type '9': the following message is displayed:

```
Zone # (x - exits):
```

Enter the zone number to read. Push the enter key. The current low limit temperature is displayed in °C as a decimal number:

```
ex: 100.00
```

If the zone number entered is out of range, the error code 'Invalid Entry' is displayed.

Menu Item #A: Read Single Zone Autotune Status

Reads the current autotune status from a single zone.

Type 'A': the following message is displayed:

```
Zone # (x - exits):
```

Enter the zone number to read. Push the enter key. One of the following values is displayed:

```
AUTOTUNE_DISABLED
AUTOTUNE_RUNNING
AUTOTUNE_SUCCESS
AUTOTUNE_FAILED
```

If the zone number entered is out of range, the error code 'Invalid Entry' is displayed.

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Menu Item #B Set Single Zone Set-Point Temperature

Sets the set-point temperature for a single zone.

Type ‘B’: the following message is displayed:

```
Zone # (x - exits):
```

Enter in the zone number to set. Push the enter key. The following message is displayed:

```
Enter value to write to zone (x - exits):
```

Enter the new set-point in °C for the zone. Push the enter key. The following message is displayed if the write to the zone is successful:

```
Writing Data to Zone… OK
```

If the value entered is out of range, the error code ‘Invalid Entry’ is displayed.

If the write to the zone failed, the error code ‘ERR03’ is displayed.

Menu Item #C: Set Single Zone High Limit Temperature

Sets the high limit temperature for a single zone.

Type ‘C’: the following message is displayed:

```
Zone # (x - exits):
```

Enter in the zone number to set. Push the enter key. The following message is displayed:

```
Enter value to write to zone (x - exits):
```

Enter the new high limit in °C for the zone. Push the enter key. The following message is displayed if the write to the zone is successful:

```
Writing Data to Zone… OK
```

If the value entered is out of range, the error code ‘Invalid Entry’ is displayed.

If the write to the zone failed, the error code ‘ERR03’ is displayed.

Menu Item #D: Set Single Zone Low Limit Temperature

Sets the low limit temperature for a single zone.

Type ‘D’: the following message is displayed:

```
Zone # (x - exits):
```

Enter in the zone number to set. Push the enter key. The following message is displayed:

```
Enter value to write to zone (x - exits):
```

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Enter the new low limit in °C for the zone. Push the enter key. The following message is displayed if the write to the zone is successful:

```
Writing Data to Zone… OK
```

If the value entered is out of range, the error code 'Invalid Entry' is displayed.

If the write to the zone failed, the error code 'ERR03' is displayed.

Menu Item #E: Reset Single Zone Autotune

Sets the autotune configuration for a single zone.

Type 'E': the following message is displayed:

```
Zone # (x - exits):
```

Enter the zone number to autotune. Push the enter key. The following message is displayed:

```
Enter in 1 for autotune reset, 2 for autotune disable (x -
exits):
```

Type either '1' or '2'. Push the enter key. The following message is displayed if the write to the zone is successful:

```
Writing Data to Zone… OK
```

If the value entered is out of range, the error code 'Invalid Entry' is displayed.

If the write to the zone failed, the error code 'ERR03' is displayed.

Menu Item #F: Set Global Zone Set-Point Temperature

Sets the set-point temperature for all zones.

Type 'F': the following message is displayed:

```
Enter value to write to zone (x - exits):
```

Enter the desired set-point in °C for all zones in the network. Push the enter key. The following message is displayed if the write to the zone is successful:

```
OK: 1
OK: 2
…
OK: x ('x' is the number of zones in the system)
```

If the value entered is out of range, the error code 'Invalid Entry' is displayed.

If a write to a zone failed, the Error code 'ERR03' is displayed.

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Menu Item #G: Set Global Zone High Limit Temperature

Sets the high-limit temperature for all zones.

Type 'G': the following message is displayed:

```
Enter value to write to zone (x - exits):
```

Enter the desired high limit temperature in °C for all zones in the network. Push the enter key. The following message is displayed if the write to the zone is successful:

```
OK: 1
OK: 2
…
OK: x ('x' is the number of zones in the system)
```

If the value entered is out of range, the error code 'Invalid Entry' is displayed.

If a write to a zone failed, the Error code 'ERR03' is displayed.

Menu Item #H: Set Global Zone Low Limit Temperature

Sets the high-limit temperature for all zones.

Type 'H': the following message is displayed:

```
Enter value to write to zone (x - exits):
```

Enter the desired low limit temperature in °C for all zones in the network. Push the enter key. The following message is displayed if the write to the zone is successful:

```
OK: 1
OK: 2
…
OK: x ('x' is the number of zones in the system)
```

If the value entered is out of range, the error code 'Invalid Entry' is displayed.

If a write to a zone failed, the Error code 'ERR03' is displayed.

Menu Item #I: Reset Global Zone Autotune

Sets the autotune configuration for all zones.

Type 'I': the following message is displayed:

```
Enter in 1 for autotune reset, 2 for autotune disable (x -
exits):
```

Type either '1' or '2'. Push the enter key. The following message is displayed if the write to the zone is successful:

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```
OK: 1
OK: 2
…
OK: x (x is the number of zones in the system)
```

If the value entered is out of range, the error code 'Invalid Entry' is displayed.

If a write to a zone failed, the Error code 'ERR03' is displayed.

Menu Item #J: Wrong Zone Number

Compares the number of detected zones versus the previous number of zones detected.

Menu Item #K: Global Temperature Alarms

Sets high and low temperature alarms in a network at once.

Type 'K': the following menu is displayed:

```
Global Temperature Alarms

Current Global Alarm Settings:

  High Global Alarm:  Disabled
  Low Global Alarm:   Disabled
  High Alarm Value:   0.00
  Low Alarm Value:    0.00


1. Enable High Global Temperature Alarm
2. Enable Low Global Temperature Alarm
3. Change High Alarm Value
4. Change Low Alarm Value

x. Exit
```

Press either '1' or '2' to enable / disable the high or low limit temperature alarm.

Press either '3' or '4' to set the high or low limit temperature in °C.

Menu Item #L: Global Error Log

Displays the last 20 errors that have occurred in the system. This includes global temperature errors, different number of zones detected errors, and single zone errors.

Below is a sample of the global error log:

```
GLOBAL ERROR LOG

120.8   High Alarm      High Global Temp = 25.00     Zone 1 Temp =
25.76
```

```
101.5   High Alarm      High Global Temp = 25.00     Zone 2 Temp =
25.68
21.7   # of Zones      Prev # = 0       Curr # = 2
```

Menu Item #M: Enable Fast Logging

This enables the fastest possible data logging. For a system with 10 modules, this time is between 1 and 2 seconds. It increases with each additional module. In this mode, every data point in every data set is updated and new.

Logging will be in the format:

```
Timestamp   ZN1    CT1    SP1   STAT1   ZN2   CT2   SP2   STAT2…
```

Timestamp - Number in seconds since the unit was powered on
ZN1 - Zone number 1
CT1 - Current temperature of zone 1
STAT1 - Current status of zone 1
ZN2 - Zone number 2
CT2 - Current temperature of zone 2
STAT2 - Current status of zone 2

A single space character (ASCII 0x20) delimits the fields. A new-line (ASCII 0x0D and 0x0A) is used at the end of each line.

Example - 3 zones

```
5.2 1 24.53 100 OK 2 25.34 105 OK 3 27.63 105 OK
10.2 1 24.57 100 OK 2 25.45 105 OK 3 27.70 105 OK
15.2 1 24.64 100 OK 2 25.45 105 OK 3 27.77 105 HIGH
```

Menu Item #N: Set External Alarm Relay State

Sets the conditions under which the external relay trips.

Type ‘N’: the following screen is displayed:

```
External Relay Setting

Current Setting:  All Errors


1. Set Alarm Relay to All Errors
2. Set Alarm Relay to High Limit Errors Only
3. Set Alarm Relay to Disabled

x. Exit to Menu
```

Menu Item #O: Read Zone Name

Reads the zone name from a specific zone.

Type ‘O’: the following message is displayed:

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```
Zone # (x - exits):
```

Enter the zone number to read. Push the enter key. The zone name is displayed:

```
ex: ZONE 1
```

If the value entered is out of range, the error code 'Invalid Entry' is displayed.

Menu Item #P: Write Zone Name

Writes a zone name to a specific zone.

Type 'P': the following message is displayed:

```
Zone # (x - exits):
```

Enter the zone number to set. Push the enter key. The zone name is displayed:

```
Enter new zone name to write to zone (! - exits):
```

Enter in the new name for the zone (up to 12 characters). Push the enter key. The following message is displayed if the write to the zone is successful:

```
Writing Data to Zone… OK
```

If the value entered is out of range, the error code 'Invalid Entry' is displayed.

If a write to a zone failed, the Error code 'ERR03' is displayed.

Menu Item #Q: Read Data Modified Flag

This feature let's a user know if a change to any parameter on any module has occurred since the last time the flag was cleared (see Menu Item #S). The two possible outcomes are 'TRUE' or 'FALSE'. 'TRUE' indicates some kind of change occurred since the last time the flag was cleared. 'FALSE indicates that no changes have occurred since the last time the flag was cleared.

Menu Item #R: System Reset

Performs a software reset of the Operator Interface. This causes the operator interface to perform a Modbus Zone Discovery (see page 6). All modules still function during this process but data logging stops temporarily.

Menu Item #S: Reset Data Modified Flag

Resets the data modified flag to 'FALSE'. See Menu Item #Q for an explanation of a data modified flag. To make Menu Item #Q a useful feature, reset the data modified flag after the last authorized write command.

Menu Item #Z: Resume Data Logging

This command exits the menu mode and returns to computer / data logging mode.

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Part II: Data Logging and Capture

Data Logging

Data logging is the default mode on initial start-up. Data logging can be turned off through the menu mode or through short form commands.

Data Logging Begins…

25.8 1 24.19 30.00 OK 2 24.73 175.00 LOW 3 24.74 175.00 LOW
27.1 1 24.19 30.00 OK 2 24.73 175.00 LOW 3 24.74 175.00 LOW
28.3 1 24.19 30.00 OK 2 24.73 175.00 LOW 3 24.74 175.00 LOW
29.6 1 24.19 30.00 OK 2 24.80 175.00 LOW 3 24.74 175.00 LOW
30.9 1 24.19 30.00 OK 2 24.80 175.00 LOW 3 24.74 175.00 LOW
32.2 1 24.19 30.00 OK 2 24.80 175.00 LOW 3 24.74 175.00 LOW

Data Capturing with HyperTerminal and MS Excel®

To capture data from the Centipede® Operator Interface, use a serial cable to connect the RS-232 port on the Centipede Operator Interface to a serial port on a PC. The PC must have a terminal emulator program installed. The below steps show how to capture data using Microsoft® HyperTerminal (included with MS Windows® XP) and MS Excel.

NOTE: MS Windows® 7 does not include a terminal emulator program. There are several 3rd Party terminal emulator programs available. Contact us if you need additional information.

1. Open HyperTerminaland configure
   - Baud Rate: 19200
   - Stop Bits: 1
   - Parity: Even
   - Data: 8 bits
   - Flow Control: None
2. To start capturing data, select Transfer, Capture Text, select path and name file, start.
3. To stop capturing date, select Transfer, Capture Text, Stop.
4. Open Captured Text File in Excel and follow menu prompts.
   a. Check Delimited, Next.
   b. Select Space, Next, Finish

Results of the data are shown below with a user added heading and border.

Time	Zone	Temp	Set	Stat	Zone	Temp	Set	Stat	Zone	Temp	Set	Stat
207	1	24.4	20	HIGH	2	23.7	175	LOW	3	26.5	175	LOW
212	1	24.4	20	HIGH	2	23.7	175	LOW	3	26.4	175	LOW
217	1	24.4	20	HIGH	2	23.7	175	LOW	3	26.5	175	LOW
222	1	24.4	20	HIGH	2	23.7	175	LOW	3	26.4	175	LOW
227	1	24.4	20	HIGH	2	23.7	175	LOW	3	26.4	175	LOW
232	1	24.4	20	HIGH	2	23.7	175	LOW	3	26.4	175	LOW
237	1	24.4	20	HIGH	2	23.7	175	LOW	3	26.4	175	LOW
242	1	24.4	20	HIGH	2	23.7	175	LOW	3	26.4	175	LOW
247	1	24.5	20	HIGH	2	23.7	175	LOW	3	26.4	175	LOW

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Part III: Short Form Commands

Short form commands are designed for direct computer-to-computer communication (e.g. reading and writing to an individual module or network of modules). The commands can be sent whenever the Operator Interface is in computer / data logging mode. Press or send Ctrl C at any point to enter the computer / data logging mode.

Note: Short form commands cannot be used while in the menu menu.

The short form commands are 4, 5, 7, 9, 12, or 19 bytes long, depending on the type of command that is sent. The data bytes that are used are assumed to be ASCII bytes, i.e. - the number '0' is ASCII 0x30. Commands can be sent as either uppercase or lowercase, or a mixture of both. The data values are decimal numbers.

A new-line byte should not be sent after the last byte of the command. Read commands are 7 bytes long, autotune write commands are 9 bytes long, and all other write commands are 12 bytes long.

Note: Data logging is suspended while the operator interface is processing a short form command and automatically resumes when completed.

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General Format Short Form Commands

The following table shows the general format for the short form commands for reading and writing values to the modules. Note: The zone name write can be up to 19 bytes long and every data byte is not shown in the below table

Data Byte	Byte Type	Valid Data	Description
1	Zone Command Header	&	
2	Packet Type	S, G, O	S - Single Zone, G - Global Zones, O - Operator Interface
3	Packet Direction	W, R	W - Write to Zone, R - Read from Zone
4	Register Header	A	A - Always the letter 'A' except for operator interface commands
5	Register Value	S, L, H, T, U, A	T - Current Temp Reg (Read only) U - Zone Status Reg (Read only) S - Set point Reg L - Low Limit Reg H - High Limit Reg A - Autotune Config Reg N - Zone Name
6	Zone Number, Digit 1	0-4	First digit of the zone number to query (use leading zeros if necessary). Note: For a global packet, use '0'
7	Zone Number, Digit 2	0-9	Second digit of the zone number to query. Note: For a global packet, use '1'
8	Data Value, Digit 1 (or Autotune Digit 1)	0-3 (0)	First digit of the data value to write to the zone (use leading zeros if necessary) - Write only
9	Data Value, Digit 2 (or Autotune Digit 2)	0-9 (1-2)	Second digit of the data value to write to the zone (use leading zeros if necessary) - Write only
10	Data Value, Digit 3	0-9	Third digit of the data value to write to the zone (use leading zeros if necessary) - Write only
1	Data Value, Digit 4	0-9	Fourth digit of the data value to write to the zone (use leading zeros if necessary) - Write only

Used for Autotune Write Commands

Used for Write Commands

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Operator Interface Short Form Commands

The operator interface short form commands follow a simpler format than the general short form commands. Below are two tables showing the possible operator interface short form commands. All write commands will respond in the same way as the corresponding read commands (i.e., &OWLx will have the &ORL response).

Operator Interface Read Commands

Command	Description	Possible Output Values
&ORZ	Read the number of zones	0 - 40
&ORL	Read the logging type	Disabled 5 Second 10 Second Fast
&ORT	Read the alarm relay setting	Disabled All Errors High Limit Errors Only
&ORF	Read the data modified flag	TRUE FALSE
&ORC	Read the global high temp alarm enable	Global High Temp Disabled Global High Temp Enabled
&ORD	Read the global low temp alarm enable	Global Low Temp Disabled Global Low Temp Enabled
&ORG	Read the global high temp alarm value	High Alarm Value: xxx.xx (where xxx.xx is a number between 0.00 - 350.00)
&ORI	Read the global low temp alarm value	Low Alarm Value: xxx.xx (where xxx.xx is a number between 0.00 - 350.00)
&ORE	Display the global error log	The error log
&ORP	Read the previous number of zones	0 - 40

Operator Interface Write Commands

Command	Description	Input Parameters
&OWLx	Write the logging type	x = 0: Logging disabled x = 1: 5 second logging enabled x = 2: 10 second logging enabled x = 3: Fast logging enabled
&OWR	Resets the operator interface	none
&OWTx	Write the alarm relay setting	x = 0: Alarm relay disabled x = 1: All errors x = 2: High Limit Errors Only
&OWF	Reset the data modified flag	none
&OWCx	Set the global high temp alarm enable	x = 0: Global High Temp alarm disabled x = 1: Global High Temp alarm enabled
&OWDx	Set the global low temp alarm enable	x = 0: Global Low Temp alarm disabled x = 1: Global Low Temp alarm enabled
&OWAG01xxxxx	Write the global high temp alarm value	High Alarm Value: xxxxx (where xxxxx is a fixed point number between 00000 - 35000)
&OWAI01xxxxx	Write the global low temp alarm value	Low Alarm Value: xxxxx (where xxxxx is a fixed point number between 00000 - 35000)
&OWPxx	Set the number of previous zones detected in the EEPROM	x = 0 - 40. The number of previous detected zones to store in the EEPROM

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Short Form Command Examples

Operator Interface Commands

&ORZ
Operator Interface, Read the number of zones in the network

Response:

```
8
```
(is the number of zones in the network)

&ORL
Operator Interface, Read the logging type

Response:

```
5 second
```
(is the logging type)

&ORG
Operator Interface, Read the global high temp alarm setting

Response:

```
100.00
```
(is high temp alarm setting)

&OWL2
Operator Interface, Write the logging type to 10 second

Response:

```
10 second
```
(is the logging type)

&OWAF0115000
Operator Interface, Write the global low alarm to 150.00

Response:

```
Low Alarm Value: 150.00
```
(is low temp alarm setting)

&OWF
Operator Interface, Reset the data modified flag

Response:

```
Data Modified Flag reset
```

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Single Zone Command Reads

&SRAT01
Single Zone, Read the Current Temp register, Zone #01

Response:

`121.32` (is the current temperature of the zone)

&SRAU39
Single Zone, Read the Status register, Zone #39

Response:

`STAT_OK` (is the current status of the zone)

&SRAA06
Single Zone, Read the autotune register, Zone #06

Response:

`AUTOTUNE_SUCCESS` (Will be the current autotune status of the zone)

&SRAL12
Single Zone, Read the Low Limit Temp register, Zone #12

Response:

`100.00` (is the low limit temperature of the zone)

&SRAN08
Single Zone, Read the Low Limit Temp register, Zone #12

Response:

`ZONE 8` (is the name of the zone)

Single Zone Command Writes

&SWAL2410000
Single Zone, Write the low limit register, Zone #24, Data value 100.00

Response:

`OK`

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&SWAS0232120
Single Zone, Write the Setpoint register, Zone #02, Data value 321.20

Response:

```
OK
```

&SWAA0701
Single Zone, Write the autotune register, Zone #07, Autotune Reset (Data 01)

Response:

```
OK
```

&SWAN03ZONE NUM 8
Single Zone, Write the zone name register, Zone #08, Zone name = "ZONE NUM 8 " . Note that extra space characters are needed at the end to have the name field equal to 12 characters.

Response:

```
OK
```

Global Zone Commands (only writes are supported for global zones)

&GWAS0132120
Global Zone, Write the Setpoint register, Data value 321.20

Response:

```
OK: 1
OK: 2
…
OK: x (where x is the total number of zones in the system)
```

&GWAH0120000
Global Zone, Write the High Limit register, Data value 200.00

Response:

```
OK: 1
OK: 2
…
OK: x (where x is the total number of zones in the system)
```

&GWAA0101
Global Zone, Write the Autotune Register, Autotune Reset (Data 01)

Response:

```
OK: 1
OK: 2
…
```

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`OK: x` (where x is the total number of zones in the system)

`&GWAA0102`
Global Zone, Write the Autotune Register, Autotune Disable (Data 02)

Response:

```
OK: 1
OK: 2
…
```
`OK: x` (where x is the total number of zones in the system)

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